## Remarks

Claims 1, 2, and 4 are pending and rejected. Newly added Claims 21-26 are presented, with Claim 26 directed to a film formed from the coating composition. Claim 21 recites the components listed in the first sentence of Paragraph 27 of the application as published. The claim includes these components in the same relative weight basis, that is, where Paragraph 27 refers to 100-200 g, the claim refers to 100-200 parts by weight. Since it would be clear to those of skill in the art that the formulation was not intended to be solely limited to this size batch, listing the components as being on a part by weight basis, using the same relative amounts, this is not believed to constitute new matter.

For the Examiner's ease of review, Paragraph 27 is reproduced below:

> [0027] In a typical formulation 100-200 g typically 165 g of resin from a group consisting of alkyd, epoxy, or polyurethane, uralkyd and 100-200 g typically 166.2 g of $TiO_2$, 20-50 g, typically 28.5 g of Talc and Calcined clay, 0-30 g, as required in the formulation were added and required quantity of a solvent mixture comprising xylene and toluene or MIBK were added such that the total volume of all the ingredients did not exceed 250 ml. The said mixture comprises nearly 2/3 of, typically, a 500 ml bottle, which was already filled with ceramic pebble used to facilitate grinding, it is then kept for grinding on a ball mill for 2 days. The coating composition was formulated for 25% PVC (Pigment Volume Concentration). The following are some illustrative compositions used.

Paragraph 15 goes on to state that the composition can include various additional components. Paragraph 15 is also reproduced below for the Examiner's ease of review:

> [0015] Coating film may also include pigments like titanium dioxide, iron oxide, zinc oxide etc., and fillers like talc, barytes, clay material and additives like

dispersants, antisettling agents, flow control agents etc., and solvents like white spirit, toluene, cellosolve acetate, MIBK, MEK etc.

New Claims 22-25 specify that the coating material of Claim 21 further includes an anti-settling agent (Claim 22), an anti-foaming agent (Claim 23), a dispersing aid (Claim 24), or a flow control agent (Claim 25). These claims are fully supported by Paragraphs 15 and 27 of the application (where the paragraph numbering is consistent with the application as published).

**Objections to the Specification**

The amendment filed 10/27/2006 was objected to under 35 U.S.C. 132(a) because it purportedly introduced new matter. The purportedly added material related to the omission of the NILSET™ 117, HAPCO™ NXZ, and BORCHI® GOI E2 from the recited coating composition. The Examiner was of the opinion that the disclosure as originally filed required the presence of the above three components, and concluded that the amendment deleting these components constituted new matter. Applicant respectfully traverses this rejection.

The amendment to the specification addressed the Examiner's previously mentioned concern that the various materials were not listed with their trademark designations. The components were not removed from the specification, but rather, the trademark designations were added, as requested by the Examiner. Accordingly, the Examiner is respectfully requested to withdraw this objection.

**Rejections Under 35 U.S.C. § 112**

Claims 1, 2, and 4 were rejected under 35 U.S.C. 112 , first paragraph. This ground of rejection was essentially the same as the objection to the specification, in that the claims were amended to delete reference to the various components NILSET™ 117, HAPCO™ NXZ, and BORCHI® GOL E2. Applicants respectfully traverse this rejection, particularly if applied to the newly presented claims.

Again, the Examiner is referred to Paragraph 27. This paragraph states that the composition includes various components. Paragraph 27 states that a typical formulation includes 100-200 g of an alkyd or epoxy resin (the other resins were removed pursuant to a restriction requirement, and thus are not discussed here), 100-200 g of $TiO_2$, 20-50 g of Talc and 0-30 g of Calcined clay. Borchi Gol, Dispersitol, Nillset, and Hapco are not mentioned at all in this paragraph. The Examiner is encouraged to consider the relative proportions of the resin, $TiO_2$, talc, and clay components in Paragraph 27, which line up with their counterparts in Claim 1.

The intent of Claim 1 as previously amended is to claim the key components identified in Paragraph 27, not the optional components identified in Paragraph 15. The absence of minor amounts of specific anti-settling agents, anti-foaming agents, dispersing aids, and flow control agents, does not go to the nature of the invention, as clearly articulated in Paragraph 27. Accordingly, Applicants respectfully submit that the absence of these specific components in Claim 1 as amended does not represent new matter.

Newly added Claim 21 specifies the exact ranges of components from Paragraph 27, and newly added Claims 22-25 specify the exact additional components (anti-settling agent, anti-foaming agent, dispersing aid, and flow control agent) from Paragraph 15. These claims are supported by the specification, and the rejection to Claim 1, even if maintained in connection with Claim 1, should not apply to Claim 21.

The various components NILSET™ 117, HAPCO™ NXZ, and BORCHI® GOL E2 are not absolutely required in the composition of Claim 1. As these are proprietary formulations, information their detailed chemical compositions is not available. However, the functionality of these additives with reference to the present invention is as submitted below.

NILSET™ 117 functions as an anti-settling agent,
HAPCO™NXZ functions as an anti-foaming agent,
DISPERSITOL™ functions as a dispersing aid,
BORCHI ®GOL E2 functions as a flow control agent.

These additives are well known in India, where the inventors reside, even if not well known to the Examiner. Information about their existence and their utility (as outlined above) is publicly available, though their exact formulation is not. A brief description of these components is provided below.

An anti-settling agent prevents the settling or formation of hard sediments caused due to aggregate instability of pigment, extender or any solid suspension. Nilset 117 is a high efficiency, pourable, organic, rheological additive with superior control on pigment settling while having marginal effect on apparent viscosity.

Anti-foaming agents prevent foaming of the composition when it is being mixed. The specific anti-foaming agent, Hapco, is a silicone based, antifoaming and de-bubbling agent effective at low concentration.

Polymeric dispersing agents function by adsorbing at the surface of the suspended particle thereby providing a protective layer that hinders particle attraction finally resulting into uniform dispersion of pigment particles in the composition. Many commercial products based on lecithin, sulphonated legnins, silicone are available. Dispersitol, the specifically listed dispersing agent, is a silicone additive for improving substrate wetting, flow and surface smoothness. It prevents pinholing, and is suitable for solvent and water based systems

Flow control agents are also known as rheology modifiers. They are used as flow promoters, de-aerating agents for air drying solvent based systems and for eliminating blistering which causes surface defects during curing. The listed commercial product, Borchi Gol E2, is a silicone free, surface active, polymeric substance.

Paragraph 4 under the subtitle 'Description of the Invention' of the specification mentions the functional use of these additives in the compositions. Their tradenames and corresponding proportions / concentrations in the various examples of the compositions are also available in the specification.

Claims 1, 2, and 4 were also rejected under 35 U.S.C. 112, first paragraph, as purportedly failing to comply with the written description requirement and also for purportedly failing to comply with the enablement requirement, and under 35 U.S.C. 112, second paragraph, as purportedly being indefinite. The basis for all of these rejections is that Claim 1 recites numerous trademarks and/or tradenames (e.g., Nilset117, HapcoNXZ, etc.) which are purportedly not adequately described or specified in the specification as originally filed.

This rejection is respectfully traversed, as the Examiner clearly understands that these elements were previously removed from the claims, as evidenced by her having raised a new matter rejection for having removed these elements from the claims. The Examiner cannot maintain a rejection for removing these elements from the claims, and also for not adequately describing these elements (that were removed from the claim). Accordingly, these grounds of rejection must be withdrawn.

**Rejections Under 35 U.S.C. § 103**

Claims 1-2, 4 were rejected under 35 U.S.C. 103(a) as being unpatentable over: U.S. Application Publication No. 2003/0195292 by Kuo et al. ("Kuo 1") or U.S. Application Publication No. 2002/0183453 by Kuo et al. ("Kuo 2")), in view of U.S. Patent No. 4,749,731 to Kyminas et al. ("Kyminas"). These rejections are respectfully traversed.

The Claimed Coating Compositions

The claimed coating compositions include an alkyd/epoxy resin, $TiO_2$, calcined clay, and, optionally, a catalyst, colorant, and barites, a suitable solvent, and reaction products thereof. All of the components are in specified concentrations.

The coating compositions provide food-safe coatings with improved barrier properties. The coating compositions include calcined clay, which gives films produced from the compositions improved barrier to oxygen and water vapor.

Kuo 1 and 2

Kuo 1 and Kuo 2 were cited as teaching the use of alkyd-based resins as binders in water-based pigmented coating compositions in order to form durable coatings/paints. The pigment is present because paint is pigmented. The coating compositions can further include various coating additives (e.g., anti-settling agents, dispersing agents, extenders, etc.). (Kuo 1, paragraphs 0033-0040, Kuo 2, paragraphs 0026-0038).

Neither Kuo reference explicitly discloses or suggests the recited amounts of various pigments.

Kyminas

Kyminas is directed to water-based coating compositions, which on air drying yield an elastic and adherent coating for protecting exterior wall and roof surfaces. The types of polymers in the Kyminas coatings are typically polyacrylic polymers, polyvinyl acetate polymers, polyvinyl chloride polymers, polyvinylidene chloride polymers, and combinations thereof, although Kyminas purportedly suggests that any polymer would work if it provided suitable properties.

Kyminas was cited as purportedly disclosing that it is well known in the art to incorporate a combination of pigments into a coating composition, wherein the compositions typically contain 3-25 wt% titanium dioxide, 5-30 wt% talc, and 1-25 wt% calcined clay in order to obtain a highly durable protective pigmented coating for exposed surfaces. (line 50-62, col. 4; line 45-66, col. 5; line 25-38, col. 6).

Purported Basis for the Obviousness Rejection

The Office Action suggests that it would have been obvious to use combinations of known pigments in the coating compositions of Kuo 1 or 2, to tailor the visual appearance, hiding power, durability, and other physical properties of the resultant coatings for specific applications. The Office Action also suggests that it would have been obvious to use effective amounts of known performance-enhancing additives in the coating compositions to improve the coating characteristics of the composition and the physical properties of the resultant coating.

Analysis

As discussed above, the Kuo references are directed to paint/coating formulations. Kynninas is directed to weatherproof exterior coatings. Kuo 1 relates to waterborne coating compositions, and to waterborne coating compositions having acrylate functionalized alkyd resins, in particular. It focuses on coating compositions with lower VOC contents for use as industrial solvent-based coatings on solid industrial substrates such as metal or non-metal as wood or alike. Referring to paragraphs 0033-0040 of Kuo 1 as cited by the Office Action, Kuo 1 discloses an invention for a waterborne, ambient oxidative cure, high solids, fast-dry coating with low VOC contents which includes:

a) modified alkyd resin that is acrylate functionalized (30-60 wt%),

b) a drying agent (0.01-1 wt%),

c) water (40-70 wt%),

d) optionally a water miscible organic solvent (0-30 wt%),

e) a pigment selected from titanium oxide, barytes, clay, calcium carbonate and CI pigment colors or combinations thereof, and

f) one or more additives for improving the coating in terms of flow control, dispersing, antifoaming and some other characteristics.

Kuo 1 teaches that the purpose of the Kuo compositions was to functionalize an alkyd resin to gain superior tack-free time, through-dry time and a low VOC content, without increasing the alkyd resin's molecular weight and glass transition temperature $T_g$ . Kuo also taught that the fast dry, tack-free properties of coating with low VOC contents prepared from that acrylate functionalized alkyd resin make it suitable for use as a industrial coating.

Kuo 1 does not teach or suggest improving the oxygen and moisture barrier capacity of the resultant coating, and, specifically, lacks any reference to its eligibility as a food grade coating. Kuo 1 does not teach or suggest using calcined clay to improve the barrier capacity of the coating.

Accordingly, there is nothing in Kuo 1 that would lead one to select the calcined clay element of the invention, let alone at use levels which provide the composition with the oxygen and moisture barrier capacity of the resultant coating.

Kuo 2 relates to water-based, fast-dry, high solids, low VOC, ambient oxidative cure coating compositions, that would exhibit the properties and advantages of high VOC coatings, in general and coating compositions comprising acrylate functionalized alkyd resins, drier and organic solvent, in particular.

Referring to the paragraphs 0026-0038 of Kuo 2, as cited by the Office Action, along with the claims and examples of Kuo 2, it is clear that Kuo 2 is also directed to achieving an acrylate functionalizing of alkyd resin, starting with hydroxyl functional alkyd resin, to achieve an ambient oxidative curing, improved tack-free time and through-dry time, and a low VOC content, all without increasing the alkyd resin's molecular weight and glass transition temperature $T_g$. Kuo taught that coatings with low VOC contents can be prepared from the acrylate functionalized alkyd resin, and the resins are fast dry, tack-free, and suitable for use in ambient oxidative cure, fast drying, high solid paint or enamel.

Paragraph 0030 of Kuo 2 refers to ambient oxidative cure enamel composition that may otherwise be followed by curing after being coated onto a substrate. Although the coating can be applied to paper, Kuo 2 does not teach or suggest achieving or improving the oxygen and moisture barrier capacity of the resultant coating, or mention any use of the compositions as food grade coatings. Kuo 2 also does not teach or suggest using calcined clay to improve the barrier capacity of the coating.

Kyminas discloses a coating material that purportedly is useful for protecting a building roof or exterior surfaces. The coating material purportedly has characteristics such as high adherence, water resistance, weathering resistance and flame retardancy. Kyminas' coating composition as described as providing excellent adhesion, durability against water ponding, fire retardancy, good reflectivity for sunlight and heat, and suitability for variety of roof and building exterior structures as substrates.

Referring to lines 50-62, col. 4, as cited by the examiner, Kyminas specifically mentions clay as an agent improving the coating qualities, when used in "sufficient' quantity." The qualities that are purportedly improved are **adhesion properties,** not the water-vapor barrier properties of the claimed compositions. The clay in Kyminas's coatings is there to improve

binding forces between the water-dispersible coating and substrates which would otherwise weaken due to excessive water logging, environmental heat, and the like.

Lines 45-66, col.5, cited by the examiner, refer to clay and other pigments, especially titanium dioxide, for their contribution towards increasing opacity of the paint system. The preferred total amount of pigments is 30-40 wt%, and the preferred amount of adhesion promoting clay is 3-18 wt%. Lines 25-38, col. 6, cited by the examiner, disclose that titanium dioxide, talc, calcined clay and mica can be used as pigments. However, the emphasis is on the qualities of these additives to bring in opacity and prevent cracking of the water-based coatings. The purported benefits Kyminas obtained from these additives (opacity, better reflectivity and aesthetic effect), relate to use of the coatings in roofing applications, not food grade materials.

Apart from these cited paragraphs, Kyminas focuses solely on aqueous coating compositions that include water-dispersible polymeric binders, pigments and filler materials with a sufficient amount of clay **to achieve desired adhesion capacity**. Kyminas does not teach or suggest coatings other than those used on building exteriors.

Kuo 1 and 2 suggest using various pigments and additives in coating compositions, but do not explicitly teach or suggest the recited amounts of the various pigments. The Kuo patents each focus on the functionalization of alkyd resins, and coating compositions prepared from these resins are a subsidiary part of the disclosure in these patents. Accordingly, nothing in Kuo 1 or 2 would guide one of ordinary skill in the art to form food-grade coating compositions, or improve the properties that are improved by the claimed compositions.

In sub-paragraph 3 of paragraph 9, the Office Action suggests that Kyminas teaches that one can incorporate a combination of pigments into a coating composition, wherein the compositions typically contain titanium dioxide (3-25wt%), talc (5-30wt%) and calcined clay (1-25wt%) in order to obtain highly durable protective pigmented coating for exposed surfaces.

Though the listed amounts of these pigment components overlap with those in presently claimed coating compositions, Kyminas teaches that these components, in these ranges, provide high durability for exposed exterior surfaces, such as walls or roofs, when exposed to extreme and dynamic weathering / environmental conditions. This teaching has nothing to do with food-safe coatings.

Therefore, even if Kuo 1 and 2 disclose pigmented alkyd resin compositions, they lack any disclosure of their respective amounts. Even if Kyminas provides typical values for amounts of pigment components in a thermoplastic coating to provide weatherproofing properties, there is no reasonable motivation to combine these teachings. Absent impermissible hindsight, one of skill in the art of alkyd resins would not look to the teachings of the pigment loadings in thermoplastic exterior building coating compositions to provide guidance on how much of these pigments to include in food grade coatings. The properties of interest in the claimed compositions are superior oxygen and moisture barrier capacity, and there would be no reasonable expectation of success that these properties would be obtained based on the weatherproofing properties of an exterior coating composition formed of thermoplastic polymers.

Further, it is not obvious to use known pigments in coating compositions, as suggested in Kuo 1 and 2, so as to tailor the visual appearance, hiding power, durability and other physical properties for the following reasons.

Kuo 1 and 2 particularly focus on improvements in industrial solvent based coatings with superior tack-free time, through-dry time and a low VOC content, without increasing the alkyd resin's molecular weight and glass transition temperature $T_g$. Kyminas particularly focuses on coating properties such as excellent adhesion, durability against water ponding, fire retardancy, good reflectivity for sunlight and heat, and suitability for variety of roof and building exterior structures as substrates.

Again, one skilled in the art would not look to the teachings of references exclusively regarding industrial / building substrate coatings and experiment with them for food grade coatings, due to the difference in the qualities demanded for such distinct applications, the types of substrates of interest, and the physical and chemical circumstances to which such coatings and corresponding coated substrates would be exposed.

As those of skill in the art are aware, if one uses the same or similar components in a composition, but in different proportions, in different sequences, undergoing different treatments / curing, and the like, it would inevitably lead to products with entirely different characteristics and applications. For example, different combinations of similar resins, pigments, additives, and solvents may lead to industrial coatings, exterior coatings, or food grade coatings, but the nature

of the invention is in selecting appropriate levels of the various components, among other things, to arrive at the desired product with the desired properties.

Again, the coatings in Kuo 1 and 2 are industrial solvent based coatings to be applied on metallic or non-metallic industrial substrates such as machines, metal surfaces, furniture, etc. The substrate relative homogeneous adhesion, corrosion resistance, chemical stability, durability and resistance against extreme physical or chemical environments, long term surface protection, etc. are the key parameters that govern the selection of composition ingredients, their proportion / concentration, sequence of adding, methods for preparing and applying the coating, etc.

The coatings in Kyminas are roof or building exterior coatings where the substrate of concern would substantially be similar to asphalt, concrete, stone, brick etc. The coating material used for protecting such surfaces is expected to be durable for longer period despite dynamic weather conditions, should have better adherence, control water penetration through capillary structures in the substrate, should have antifungal strength.

Both these types of coatings as discussed above serve as surface protective layers that isolate the substrate surface from the surrounding conditions that would otherwise deteriorate the surface and subsequently the inner layers or deep core parts of the surface. The substrate surface itself has certain capacity to withstand the deteriorating agents around, only for the significantly long term protection needs or under extremely reactive physical / chemical ambient conditions, one needs to apply the protective coatings.

The role of these coatings is complementary to further slow down the impact of deteriorating factors. Hence, such coatings compositions depending on their quality may undergo certain chemical / physical changes that are acceptable as far as they are negligible on the time scale considered and do not result in serious damage of the substrate. Food grade coatings, on the other hand, have more stringent and definitive quality and performance needs in terms of its barrier capacity and chemical stability.

The claimed coating compositions can be used in food grade applications, such as food packaging, for example, edible oil packaging, specifically when used to coat paperboard / cardboard. This type of substrate is more porous and significantly thinner (typically in mm) compared to the concretized building surfaces or industrial surfaces referred earlier. Hence the

environmental factors – moisture and oxygen particularly – can penetrate easily and deeply through the substrate to reach the food/oil contents. Unlike the substrates coated with the Kuo/Kyminas coatings, the paperboard/cardboard has poor inherent strength to withstand the impact of these environmental agents. Hence, the coating quality and its capability for producing and maintaining barrier strength are important properties of the claimed coating compositions. Also, the time scale on which the contaminants intrude into the packaging material is comparable to the shelf life of the contents (oil), and the vulnerability of the contents (oil) is quite high, so immediate and effective preventive measures are desirable.

As the Examiner can certainly appreciate, it is challenging to prepare food grade coatings. One must select suitable components, in the right proportions/concentrations, and prepare the coatings on a suitable packaging material to achieve desirable properties, such as successfully decelerating the diffusion of gaseous contaminants so as to achieve nil or near zero spoilage of enclosed food/oil items.

The person of ordinary skill in the art attempting to produce such a coating composition, and packaging material produced from the composition, must scrutinize and evaluate the array of materials available as binders, solvents, additives, pigments, fillers etc. for picking most appropriate elements to produce the composition. Absent impermissible hindsight, the person of ordinary skill would look for the literature relevant to, and particularly describing, the problems associated with food packaging films/coatings; the materials used for such packaging/coating, compositions and processes for providing moisture-proof coating compositions with acceptable gas permeability. The person would not look for guidance in documents describing industrial or structural surface coatings.

For any of these reasons, Applicants respectfully assert that the claimed compositions are not obvious.

**Conclusion**

On the basis of the above-presented arguments and amendments, it is believed that the application is now in condition for allowance. Prompt consideration and allowance is respectfully requested. The Office is invited to contact the undersigned at (919) 484-2382 regarding any question concerning this filing.

Respectfully submitted,

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